

**Notice of Allowability**

Application No.

10/588,396

Applicant(s)

HAYASHI, NORIYA

Examiner

Art Unit

Hannah Pak

1796

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 08/06/2009.
2. ☒ The allowed claim(s) is/are 1-14, 16-19, and 21.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some\* c) ☐ None of the:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
- \* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |   |
|--|---|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 5. <input type="checkbox"/> Notice of Informal Patent Application   |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date <u>February 22, 2010</u> . |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____    | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment   |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance                                  |
|  | 9. <input type="checkbox"/> Other _____.  |

/Hannah Pak/  
Examiner, Art Unit 1796

/Vasu Jagannathan/  
Supervisory Patent Examiner, Art Unit 1796

## DETAILED ACTION

### EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Timothy Trop on February 22, 2010.

The application has been amended as follows:

Claim 1 is amended as follows:

1 (Currently Amended). A neutron ~~neuron~~ shielding material composition comprising:  
a polymerization initiator;  
a polymerization component;  
a refractory material having higher density than that of a resin component comprising said polymerization initiator and said polymerization component;  
a density increasing agent having higher density than that of said refractory material;  
a boron compound,  
wherein said neutron shielding material composition maintains the density of a base resin comprising said resin component and said refractory material; and  
wherein density of the neutron shielding material composition is from 1.62 g/cm<sup>3</sup> to 1.72 g/cm<sup>3</sup>.

Claim 2 is amended as follows:

2 (Currently Amended). The neutron ~~neuron~~ shielding material composition

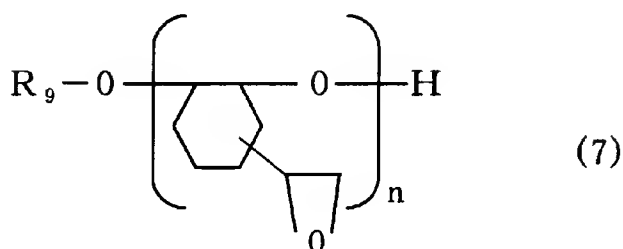
wherein R<sub>1</sub> to R<sub>4</sub> are each independently selected from the group consisting of CH<sub>3</sub>, H, F, Cl and Br, and n is 0 to 2 in the structural formula (2), R<sub>5</sub> to R<sub>8</sub> are each independently selected from the group consisting of CH<sub>3</sub>, H, F, Cl and Br, and n is 0 to 2 in the structural formula (3), n is 1 to 12 in the structural formula (5), and n is 1 to 24 in the structural formula (6); and a C<sub>1-20</sub> alkyl

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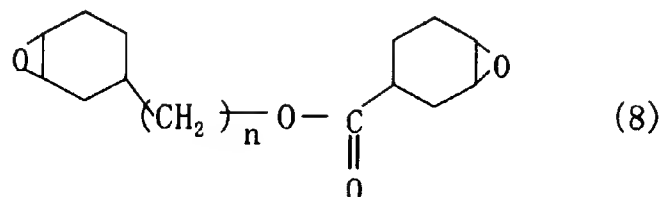
group.

Claim 7 is amended as follows:

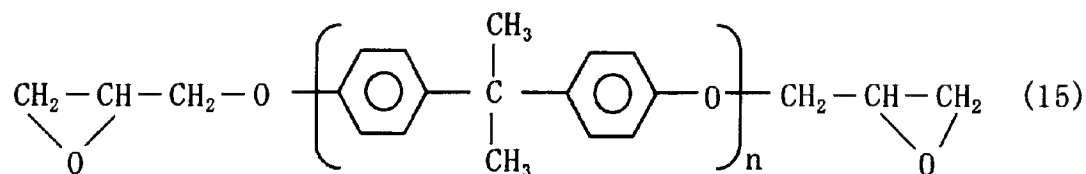
7 (Currently Amended). The neutron shielding material composition according to claim 3, wherein the epoxy component comprises at least one compound selected from the group consisting of compounds a compound of the structural formula formulas (7), (8), (15), and (17):



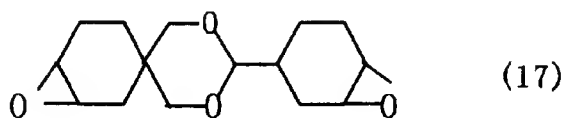
wherein  $R_9$  is a C1-10 alkyl group or H, and  $n$  is 1 to 24; a [[10]] compound of the structural formula (8):



wherein  $n$  is 1 to 8; a compound of the structural formula (15):



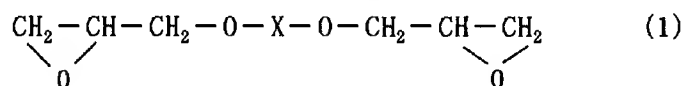
wherein  $n$  is 1 to 3; and a compound of the structural formula (17).



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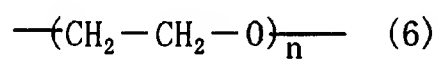
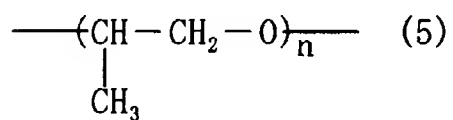
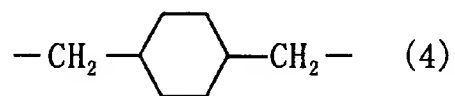
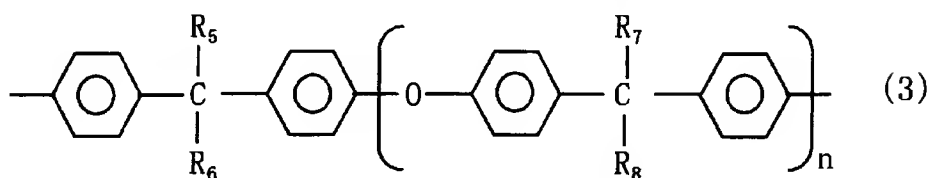
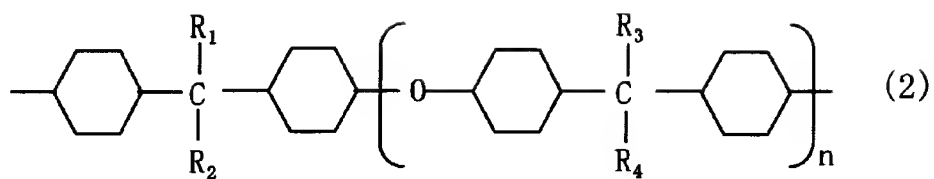
Specification is amended as follows (beginning on page 4, line 7 of the specification):

The present invention provides a neutron ~~neuron~~ shielding material composition comprising a polymerization initiator, a polymerization component, a density increasing agent and a boron compound. The present invention provides a neutron shielding material composition not comprising a curing agent. The composition preferably comprises an epoxy component as the polymerization component. The composition particularly preferably comprises a hydrogenated epoxy compound as the epoxy component. The hydrogenated epoxy compound herein refers to an epoxy compound having an increased hydrogen content obtained by hydrogenating at least part of a benzene ring to break conjugation of the part of the benzene ring but nevertheless maintain the cyclic structure. In the present invention, the epoxy component preferably comprises a compound of the structural formula (1):

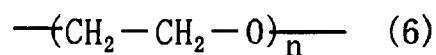
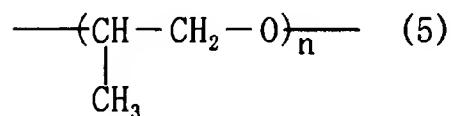
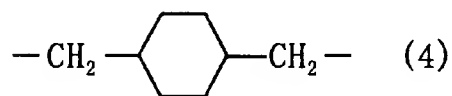
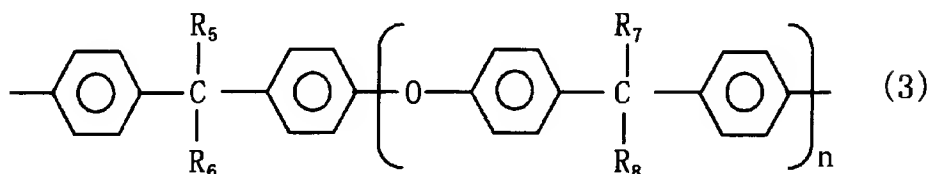
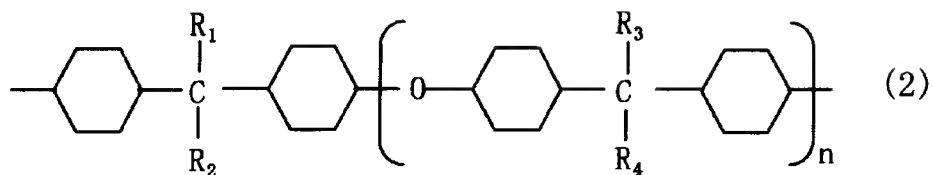


wherein X is at least one compound selected from compounds of the structural formulas (2), (3), (4), (5) and (6):

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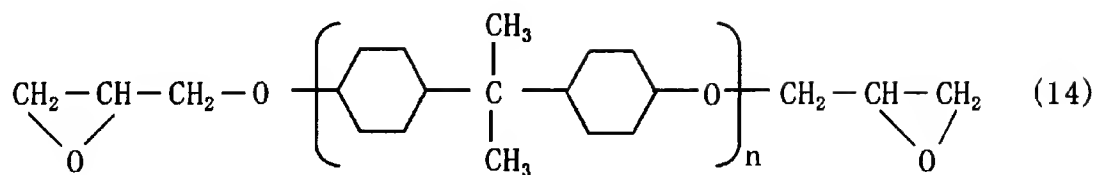


wherein  $\text{R}_1$  to  $\text{R}_4$  are each independently selected from the group consisting of  $\text{CH}_3$ , H, F, Cl and Br, and  $n$  is 0 to 2 in the structural formula (2),  $\text{R}_5$  to  $\text{R}_8$  are each independently selected from the group consisting of  $\text{CH}_3$ , H, F, Cl and Br, and  $n$  is 0 to 2 in the structural formula (3),  $n$  is 1 to 12 in the structural formula (5), and  $n$  is 1 to 24 in the structural formula (6); and a C1-20 alkyl group.

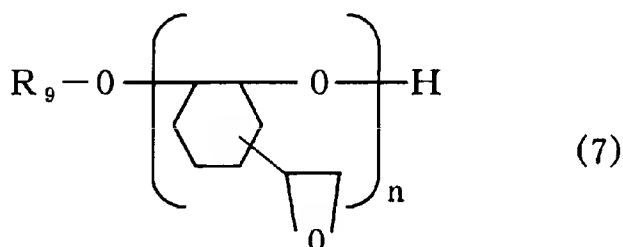
Specification is amended as follows (beginning on page 5, line 9 of the specification):

The epoxy component preferably comprises a compound of the structural formula (14):

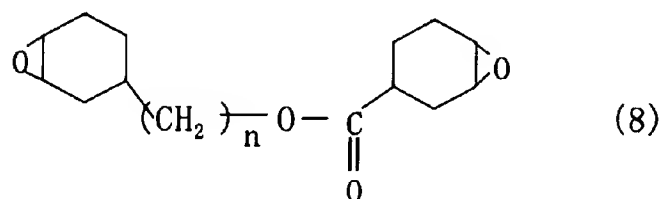
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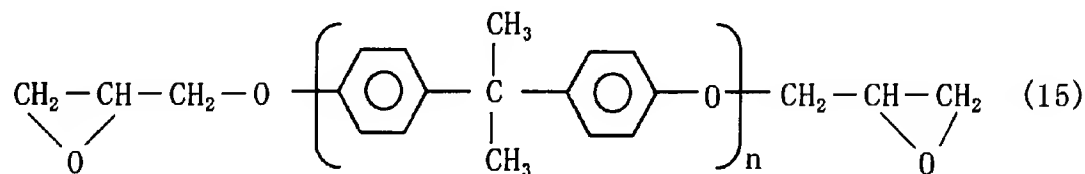
wherein  $n$  is 1 to 3. The epoxy component also preferably comprises at least one compound selected from the group consisting of ~~a compound~~ compounds of the structural ~~formula~~ formulas (7), (8), (15), and (17):



wherein  $\text{R}_9$  is a C1-10 alkyl group or H, and  $n$  is 1 to 24; a compound of the structural formula (8):

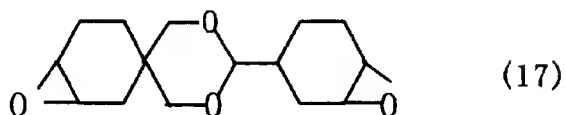


wherein  $n$  is 1 to 8; a compound of the structural formula (15):



wherein  $n$  is 1 to 3; and a compound of the structural formula (17).





**2. The claims are renumbered as follows:**

Claim 1 becomes claim 1.

Claim 2 becomes claim 2, which depends on claim 1; reads "The neutron shielding material composition according to claim 1."

Claim 3 becomes claim 3, which depends on claim 1; reads "The neutron shielding material composition according to claim 1."

Claim 4 becomes claim 4, which depends on claim 3; reads "The neutron shielding material composition according to claim 3."

Claim 5 becomes claim 5, which depends on claim 3; reads "The neutron shielding material composition according to claim 3."

Claim 6 becomes claim 6, which depends on claim 3; reads "The neutron shielding material composition according to claim 3."

Claim 7 becomes claim 7, which depends on claim 3; reads "The neutron shielding material composition according to claim 3."

Claim 8 becomes claim 8, which depends on claim 1; reads "The neutron shielding material composition according to claim 1."

Claim 9 becomes claim 9, which depends on claim 1; reads "The neutron shielding material composition according to claim 1."

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Claim 10 becomes claim 10, which depends on claim 1; reads “The neutron shielding material composition according to claim 1.”

Claim 11 becomes claim 11, which depends on claim 10; reads “The neutron shielding material composition according to claim 10.”

Claim 12 becomes claim 12, which depends on claim 1; reads “The neutron shielding material composition according to claim 1.”

Claim 13 becomes claim 13, which depends on claim 12; reads “The neutron shielding material composition according to claim 12.”

Claim 14 becomes claim 14, which depends on claim 1; reads “The neutron shielding material composition according to claim 1.”

Claim 16 becomes claim 15, which depends on claim 1; reads “The neutron shielding material composition according to claim 1.”

Claim 17 becomes claim 16, which depends on claim 1; reads “The neutron shielding material composition according to claim 1.”

Claim 18 becomes claim 17, which depends on claim 1; reads “A neutron shielding material produced from the neutron shielding material composition according to claim 1.”

Claim 19 becomes claim 18, which depends on claim 17; reads “A neutron shielding container produced from the neutron shielding material according to claim 17.”

Claim 21 becomes claim 19, which depends on claim 15; reads “The neutron shielding material composition according to claim 15.”

***Reasons for Allowance***

3. The present claims are allowable over the “closest” prior art, namely **Hayashi** (JP 2003-066189) and **Anayama et al.** (EP 0 628 968 A1).

The broadest claim, independent claim 1, recites as follows:

1 (Currently Amended). A neutron ~~neuron~~ shielding material composition comprising:

- a polymerization initiator;
- a polymerization component;
- a refractory material having higher density than that of a resin component comprising said polymerization initiator and said polymerization component;
- a density increasing agent having higher density than that of said refractory material;
- a boron compound,

wherein said neutron shielding material composition maintains the density of a base resin comprising said resin component and said refractory material; and

wherein density of the neutron shielding material composition is from 1.62 g/cm<sup>3</sup> to 1.72 g/cm<sup>3</sup>.

According to page 23 of the present specification, the density claimed is obtained, via employing 5-40 mass percent of density-increasing agents based on the total amount of the neutron shielding material composition. The density-increasing agent is identified as metal powders (see Pages 21-22 of the present specification). None of the references cited teaches or would have suggested a neutron shielding material composition having the claimed specific ingredients with the density of 1.62 g/cm<sup>3</sup>-1.72 g/cm<sup>3</sup>.

**Hayashi**, relied upon as the primary reference in the previous action, for example, discloses a neutron shielding material composition having **1)** a polymerization initiator, **2)** a polymerization component containing a hydrogenated epoxy resin, **3)** a boron compound, and **4)** a refractory material having higher density than that of a resin component comprising the polymerization initiator together with the polymerization component (Paragraphs 1, 9, and 36-37).

**Hayashi** does not teach or suggest forming a neutron shielding material composition having the claimed density, much less utilizing a density increasing agent, for the purpose of obtaining a neutron shielding material composition having a density.

**Anayama et al.**, relied upon as the secondary reference in the previous action, do not remedy the deficiency in Hayashi et al.

**Anayama et al.** fail to mention forming the neutron shielding material composition having any particular density. In fact, it employs density-increasing agents, such as metal powders, in an amount that would not form the neutron shielding composition having the claimed density. In particular, **Anayama et al.** teach employing equal to or greater than 50 parts by weight of density increasing agent based on the total amount of the neutron shielding material composition (Page 3, lines 30-45). According to page 23 of the present specification, the use of such amount will suggest away from forming the neutron shielding material composition having the claimed density.

4. Additional pertinent prior arts have been uncovered in further search.

**Carden** (US 5,700,962) also teaches away from the claimed invention via forming the neutron shielding material composition having a density of 2.5-2.8 g/cm<sup>3</sup> containing density-increasing agents, such as metal powders (Abstract). See *In re Sebek*, 465 F.2d 904, 907 (CCPA 1972) (“Where, as here, the prior art disclosure suggests the outer limits of the range of suitable values..., the determination of optimum values outside that range may not be obvious.”); See also *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994) (“A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.”)

**Kamoshida et al.** (US 2003/0102445) discloses a neutron shielding material containing an epoxy resin. However, **Kamoshida et al.** fail to disclose using additional claimed materials, such as a polymerization initiator, refractory material, density-increasing agents, and boron compound, in forming the neutron shielding material composition having the claimed density.

5. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

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6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hannah Pak whose telephone number is (571) 270-5456. The examiner can normally be reached on Monday - alternating Fridays (7:30 am - 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on 571-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Hannah Pak  
Examiner  
Art Unit 1796

/HP/

/Vasu Jagannathan/  
Supervisory Patent Examiner, Art Unit 1796

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